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POLAND

CSSR GEOLOGISTS PART OF CEMA COOPERATION IN CUBA, VIETNAM, MONGOLIA

Prague LIDOVA DEMOKRACIE in Czech 31 May 83 p 3

[Interview with Dr J. Pravda, chairman of the Czech Geological Office, by L. Kyptova, during the 24-27 May session of the CEMA Permanent Commission for Co-operation in Geology, in Karlovy Vary]

[Text] The 45th session of the CEMA Permanent Commission for Cooperation in Geology ended on Friday of last week in Karlovy Vary, with the signing of the final protocol. The four-day session was attended by leading geologists from every CEMA country, representatives from Yugoslavia, observers from the People's Democratic Republic of Yemen, and representatives of the CEMA Secretariat.

The agenda of the session was highly important and very interesting. Not only the results of scientific research to date were discussed, but also the questions of developing the raw material base of the individual socialist countries, and the prospects of further cooperation among geologists in prospecting for, proving and exploiting mineral deposits. The Czechoslovak delegation at this session was headed by our representative on the CEMA Permanent Commission for Cooperation in Geology and the chairman of the Czech Geological Office, Dr J. Pravda. On this occasion we requested him to grant us an interview.

[Question] With what objective did the individual delegations come to the Karlovy Vary session, and which of the discussed questions do you regard as the most important from the viewpoint of further cooperation among geologists within CEMA?

[Answer] It should be pointed out at the very beginning that the entire course of the permanent commission's session has been very successful. There were in all 12 items on our agenda. Naturally, I am unable to list them all, therefore I will confine myself to the most important ones. First of all we discussed the tasks stemming from the resolution adopted at the 105th session of the CEMA Executive Committee. It emphasized the need to intensify cooperation in geological exploration and prospecting, especially for petroleum, natural gas and coal, and it also pointed out the need to constantly improve the efficiency and technical level of such joint efforts. Also an informative report was prepared for the CEMA Executive Committee on the results of geological exploration now being conducted on the territories of Vietnam, Mongolia and Cuba.

[Question] We know that also Czechoslovak geologists are working specifically in these countries. Together with specialists from other CEMA countries, they are contributing eminently toward exploring the mineral wealth of these countries.

Could you tell us of what results has Czechoslovakia been able to boast at this session, and have we been able to discover any new significant raw-material deposits in Cuba or Vietnam?

[Answer] The work of our geologists abroad has a good reputation, and I think that the results we are achieving in Cuba or Vietnam can only support this reputation. So far as Cuba is concerned, the task that we have been assigned (within the framework of the general agreement among the interested CEMA countries) is the exploration of so-called Region V, a part of the country's southern regions. This includes mostly the provinces of Villa Clara, Sancti Spiritus and Cienfuegos. Here we are conducting basic geological mapping of an area that is roughly 5000 square kilometers, geophysical prospecting on 1500 km^2 and geochemical prospecting on 2170 km^2. In this region we have succeeded in sinking exploratory holes to a combined total depth of 26,750 meters. About the specific results? We have discovered, for example, a promising deposit of phosphate ores, also pyrites, a promising occurrence of copper with an admixture of molybdenum, etc. The Soviet experts who are working in Region I have found an interesting deposit of polymetallic ores with a high silver content, etc.

In the Socialist Republic of Vietnam--again on the basis of a general agreement--we are participating in the basic geological mapping of that country. In addition, we are conducting prospecting that is aimed at discovering deposits of bauxite and nonmetallic raw materials. It is likewise our task to build a central geophysical shop for the servicing and repair of geophysical instruments, to equip this shop, and to train its future Vietnamese personnel. The mentioned shop is intended to serve geophysicists from entire Vietnam. Our experts were among the first to begin mapping in the field in January of this year. They are working in the southern part of the country where the environment is characterized by the destructive consequences of warfare, left behind by the Americans. However, it is evident already from the preliminary briefing that geologically this is a very interesting region.

[Question] Cooperation among geologists from socialist countries in prospecting for mineral raw materials on the territory of Mongolia already has traditions of several years' standing. Here, too, Czechoslovak geologists have scored a number of successes. Could you tell us how the work is proceeding at present of the International Geological Expedition, in which Czechoslovakia is participating, and whose results have already led, for example, to the fact that we already are importing from Mongolia such a valuable metallurgical raw material as fluorite?

[Answer] I could talk long about geological research on the territory of Mongolia, because that country is a geologist's paradise, as evident also from the recent results. On the basis of an agreement on multilateral cooperation within the framework of the mentioned International Geological Expedition, in the period just ended work continued, for example, on the exploration of the Undur Cagan tungsten-molybdenum deposit, also exploration of the promising Chulyn Cholbo fluorite deposit, and prospecting uncovered new promising occurences of polymetallic ores containing silver. Sites were discovered with occurrences of rare elements such as tantalum, niobium, vanadium, etc. A part of the expedition continued the exploration of the southern Gobi desert where also our geologists are participating in mapping and prospecting.

[Question] The signed final protocol opens further possibilities for even more efficient cooperation by the member nations of CEMA in the area of searching

for and utilizing mineral raw materials. To what is the most attention being devoted?

[Answer] Once again it is not possible to answer you briefly, because the approved tasks are a legion, whether they concern measures to develop cooperation in finding and exploring deposits of petroleum, natural gas, coal and other raw materials essential to the economies of the CEMA countries, or providing the materials and equipment for geological work, etc. Proposals likewise were discussed to develop cooperation between the CEMA Secretariat and the United Nations Committee for Natural Resources, which in the future should lead to better information about the possibilities of jointly utilizing the world's mineral resources. And finally, proof of the expanding cooperation among the CEMA countries is also the fact that observers from the People's Democratic Republic of Yemen likewise attended the Karlovy Vary session. Specialists from Czechoslovakia, the Soviet Union and the German Democratic Republic will soon begin joint mapping of that country.

1014
CSO: 2402/56

REPORT ON DEVELOPMENT, RESEARCH IN LASER TECHNOLOGY

Sofia VECHERNI NOVINI in Bulgarian 4 Jun 83 p 4

[Article by Lyudmil Mitakev: "Modern Directions in Scientific and Technical Progress"; passages enclosed in slantlines printed in boldface]

[Text] The first Bulgarian laser apparatuses for industrial purposes went into operation 4 years ago. They are called "LIR-1" and were developed at the Special-Problems Scientific Research Laboratory and Laser Equipment Production Section at Kliment Okhridski Sofia University.

The first specialists in quantum electronics and laser technology at Sofia University started their research in 1965. Most of them came from the Soviet Union. They received solid training there under world-famous scientist, Academician Rem Viktorovich Khakhlov, at Moscow State University. A turning point came after the National Party Conference of 1978 which defined the development and application of laser technology as a strategic direction for the country to take. The Chair of Quantum Electronics was set up at once in the Physics Faculty, and a little later the laser technology laboratory as well.

The original subject matter--research in the area of nonlinear optics, study of the new optical processes brought about with the creation of lasers--was borrowed from Moscow University too. The staff very rapidly built up the necessary experience and by now has at its disposal the laser apparatuses for solving various problems in industry.

The "LIR-1" cuts out the control portion of the metallized coating of electrodes for arc furnaces. The scientists produced the apparatus, on order from the L. I. Brezhnev SMK [Economic Metallurgical Combine], in only 6 months. And it has operated successfully thus far. Scientific research is conducted with it, too. Since the "LIR-1" monitors the graphite coating created in accordance with the world-famous patent of Engr Aleksandur Vulchev, it is most likely that the countries that have purchased the license will show marked interest in the laser apparatus.

The idea of the series of /"Granat" [Garnet] laser devices/ likewise had its origin in the needs of industry. Recently the semiconductor industry switched over to so-called hybrid integrated circuits, the greatest problem with which is functional tuning. The scientists from Sofia University experimented in

one of the laboratories on the effect of lasers on a thin layer. The result was good. A new "Granat-N" apparatus was designed. The requirements of the users were met--it tuned excellently, was simplified to the maximum, was cheap and reliable. The scientific production combine in Botevgrad was the first customer. Later this apparatus was produced at the Microelectronics Institute in Sofia, too. From three "Granat-N" apparatus alone the economic effect has been 200,000 leva, but since the interest abroad is great, exports are expected, too.

On its very first appearance at the Plovdiv fair in 1981 the "Granat-N" won a gold medal, while the improved apparatus design brought it the national Golden Hands award of the State Committee for Science and Technical Progress last year.

Another apparatus of the series is the "Granat-M." It handles the precision engraving and marking of various products. With it the lettering is made on metal parts in machine building, as well as on various products of light industry. What was rapidly developed in some leading countries in recent years is today an accomplished fact for Bulgaria, too.

The "Granat-M" has a keyboard with which the necessary text or digits are entered into the electronic memory. The laser then fully automatically inscribes the information on the product. Requests for laser engraving and marking are increasing every day.

Nor is the interest any less in another development of the laboratory--/the laser interferometer/. With it accurate information is obtained about dimensions, displacements and velocities. Accuracy is within one-tenth, even one-hundredth of a micrometer (one-thousandth of a millimeter). The result is in digital form, thereby facilitating its application, which is great and has a high economic effect. The device is used first and foremost for exceptionally accurate measurements during the production of metal-cutting machinery. The device has had an especially good reception in the field of microelectronics. The first interferometer by now has been operating for several months at the Central Computer Equipment Institute. Soon mates of it, but improved, more accurate and convenient, will be delivered to a number of enterprises in the country.

The head of the laboratory and of the chair of quantum electronics, Docent Konstantin Stamenov, told us about the future, "We are developing an apparatus for scribing, i.e. scoring to separate elements of the semiconductor industry. At present this is done with diamond cutters and about 30-percent spoilage results. With application of our development, spoiled elements will be an insignificant quantity.

"We are investigating new lasers and their characteristics. We are studying excimer lasers, continuously tunable liquid lasers and picosecond lasers for investigating fast processes in chemistry.

"We are making our contribution also to environmental protection. Methods have already been devised for the rapid analysis by laser of the impurities in

water. By contract with the Environmental Protection Committee, we will produce a fluorimeter, a laser instrument to determine pollutants. This analysis is noted for its high sensitivity and speed of measurement. In just a few minutes what is in the water will be known both quantitatively and qualitatively. Our experience will enable us to produce both sensitive sensors and elements to take readings of the state of the air.

"Our task will also be the speedy solution of a given problem for industry. For example, if a few special-purpose apparatuses are needed for an individual production process, the laboratory will make them. Here is where the future of the special-problem laboratory and laser-equipment production section lies, too."

6474
CSO: 2202/14

NEW DEVICE REDUCES NITROGEN OXIDE EMISSION

Rangoon THE WORKING PEOPLE'S DAILY in English 30 May 83 p 7

[Text] PRAGUE, 28 May—A new method of reducing emissions of nitrogen oxides which are the worst pollutants of the air has been developed in the Institute of Inorganic Chemistry of the Czechoslovak Academy ofSciences and Chepos; Chemical Installations Research Institute.

The method of selective catalytic reduction changes nitrogen oxides into a harmless gas. In numerous laboratory tests, best results were achieved with vanadium catalysts.

A device designated "Renox 604" was developed and built which reduces by more than 90 per cent the content of nitrogen oxides in 120,000 cubic metres of gaseous emissions per hour.

The installation of the device requires no changes to be made in the production process in chemical plants. Also not necessary are any imports, and there has already been interest abroad in the emission-reducing device.

The installation of the device in the North Bohemian Chemical Complex in Lovosice reduces nitrogen oxides emissions by more than 4,000 metric tonnes a year, and prevents direct damage estimated at seven million crowns a year.—*NAB/CTK*

CSO: 2020/41

MAP OF HUMUS CONTENT IN CSR SOIL PREPARED

Prague ZEMEDELSKE NOVINY in Czech 30 Apr 83 p 3

[Interview with Dr Frantisek Pospisil, director of the Institute for Experimental Botany of the Czechoslovak Academy of Sciences, by Eng J. Parik: "An Enriched Understanding of Dynamic Interrelationships"; at the institute; date not given]

> [Text] Amidst the greenery on the southern slope of Hanspaulka in the Dejvice district of Prague stands an older villa. At the entrance to the spacious garden is a modest tablet with the inscription: "Institute for Experimental Botany of the CSAV [Czechoslovak Academy of Sciences]."

The large size of the garden above and to the rear of the villa has made it possible to construct not only greenhouses but a new building as well--modern pavilions with laboratories. Inside Dr Frantisek Pospisil, DrSc, awaits us. A door leads from the director's office into the adjoining room, full of a variety of instruments which are evidently constantly being used in scientific work. This is no accident but rather proof that despite his managerial duties the director cannot tear himself away from his work, which he began while still a student under Academician Silvestra Prata at the Faculty of Natural Sciences in Prague. This teacher inspired him with the idea of studying the organic matter in soil.

This orientation was a familiar one to the beginning scientific worker, in that he is a villager by birth. His native village is tucked away in the countryside near Tisnov on the Moravian side of Vysocina. So he knew even as a boy how much farmers respected and still respect the soil and how essential it is to care for the soil and its fertility.

Then came years of hectic scientific work, which Pospisil spent at the Research Institute for Plant Productivity in the Ruzyna district of Prague. Nor did he cease such work even when he was named director of the Institute for Experimental Botany of the CSAV 10 years ago. "There is still so much left to learn about humus and organic matter in the soil," says Pospisisl even now, "that we cannot rest even in the coming years."

Soil humus has been and is being studied by students at trade schools, high schools and colleges. Its significance for soil fertility is thus widely recognized by whole generations of agricultural workers, even though during an age of chemicals and the use of large quantities of synthetic fertilizers, organic matter in the soil is not receiving as much attention as it deserves. General knowledge of the composotion and effect of humus has gradually become outdated as knowledge of this subject has become increasingly detailed both in our country and abroad. We have a tradition, several decades long, of humus research, as is shown also by the interest evidenced by specialists throughout the world in our symposia "Humus et Planta," which we organize regularly.

But the new data obtained by modern experimental methods had to be collected, verified, and further enriched. Dr Frantisek Pospisil has made significant contributions in this area through his scientific work. From the earliest days of his research he has reviewed and evaluated data contributed by scientists around the world on the function and composition of soil humus as it relates to other soil properties and with respect to the dynamic interrelations and the mutual influence of the various factors responsible for soil fertility. He was interested in these new data from the viewpoint of how these data enrich the theory of soil humus and how they could serve agriculture.

He started with the idea that it is above all necessary to understand the content and composition of humus in the variegated mosaic of soil types, sorts, and varieties. To this purpose, he made use of results collected over many years by the Soviet school of soil science, according to which humus can be divided into three basic types: the first type is characterized by its lower content of humus acid in relation to the so-called fulvoacids, while the humus acids are not for the most part bound to mineral particles in the soil. In the second type, high-molecular-weight humus acids predominate, especially those bound to the mineral fraction of the soil. The third type has a low content of humus acids and fulvoacids. The composition of humus acids is relatively well known, while less is known about the relation between the quality of humus and the air and water-holding capacity of soil, and the mineral nourishment of plants, which is, of course, significant in studying and increasing soil fertility.

Dr Pospisil has taken up this problem in his studies, developing and substantiating original methods for determining the humus content and composition of various types and sorts of soils. These methods have been used in a long-term program, unique in the world, of "Comprehensive Soil Research," carried out throughout our entire republic. The author started with the idea that the decisive factors are not the individual analytic data on the soil or the content and composition of soil humus, but rather the relation of such information to the physical and chemical properties of soil.

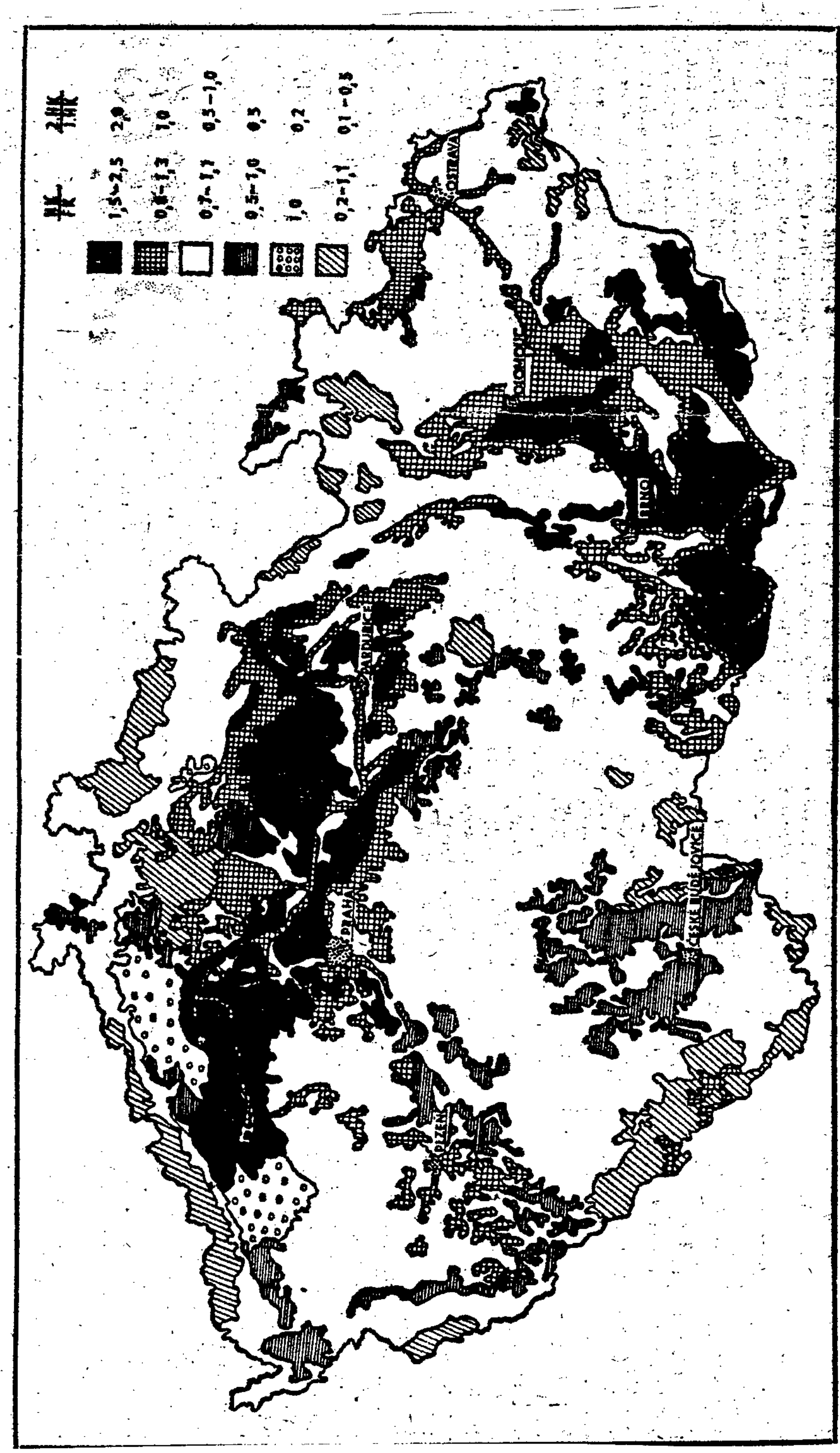
But how can we characterize these mutual relations and dependences? Dr Posipsil has done so using original methods of mathematical statictics and graphic illustration. It has been possible on this basis to construct a map of soil humus composition for the entire territory of the CSR.

He then proceeded to the next stage, in accordance with the workdwide orientation of research. He concentrated on characterizing humus composition and worked out a valuable method for evaluating humus content according to the optical properties of humus compounds, which is highly esteemed by specialists throughout the world.

But what is the relation between humus and plants? This was the next page in Dr Pospisil's scientific work on humus. He started with Academician S. Prata's work on the effect of humus on plants. He succeeded in discovering and formulating some unknown relations between humus compounds and plants; especially noteworthy is the relation between humus compounds and organophosphates.

The presence of humus compounds results in a decrease in the toxic effect of organophosphates, i.e., insecticides, on plant metabolism, which is significant for soil detoxification.

From the very beginning, Dr Pospisil has oriented his scientific research in such a way that his final formulations might be useful in practice. His techniques are utilized particularly widely by workers in control labs of the Central Control and Research Institute of Agriculture in their daily practice. On the basis of the data obtained on humus one can more precisely define the amounts of fertilizers needed and use them more economically. This is one of the graphic examples that goal-oriented research sooner or later yields a rich harvest to society. Therefore such work deserves the recognition and appreciation of all of us.



Map of the composition of soil humus in the CSR: HK/FK is the ratio of humus acids to fulvoacids and 2.HK/1.HK is the ratio of bound to free humus acids.

9832
CSO: 2402/46

BIOLOGICAL PEST CONTROL SUCCESSFUL IN AGRICULTURE

Bratislava ROLNICKE NOVINY in Slovak 28 May 83 p 5

[Article by Peter Jaslovsky: "Insects Instead of Chemicals"]

[Text] Every agricultural enterprise that grows vegetables in large greenhouses has problems with plant lice. They are literally pests that thrive in this environment of higher temperature and humidity, conditions that accelerate their life cycle.

It is possible to protect greenhouses from this louse plague only through repeated spraying with chemicals. However, it is necessary to spray 9 to 12 times during a single vegetation period. But the result of these protective measures is that strains of lice or mites are developed that are resistant to the chemical preparations used so far. We know from practical experience that if there are no other types of insecticides in reserve, these small parasites are able to destroy entire cucumber and tomato crops in greenhouses, and even certain types of flowers, within a matter of few days.

Chemical protection seems to have reached a certain crisis, and therefore more effective new methods are being sought to control insect pests. In this situation there is practically no other solution than to attempt to create an ecological balance in the greenhouses, which seems simple enough but in fact is not. For the more diverse an ecological system and the more species of plants and animals it contains, the more stable it is and the smaller the danger that one of pests might suddenly multiply. From this point of view the situation in greenhouses is extreme because usually only a single crop is grown at any given time. If there are parasites of the individual plants in this environment, they multiply very rapidly because they have no natural enemies. One the other hand, however, specifically the one-crop system and the constant, nonchanging climatic conditions make greenhouses ideal laboratory models for testing the effectiveness of new biological methods of plant protection.

Experiment With a Capital E

Staff members of the Agricultural College and of the CSAV [Czechoslovak Academy of Sciences] Institute of Entomology in Ceske Budejovice, in cooperation with the Joint Agricultural Enterprise in Marsova, conducted an experiment to control the hop mite, with the help of a predatory mite from the tropical and subtropical regions of Chile. Our research stations obtained this mite from the Soviet Union, and partially from the Netherlands where it was first used for the natural control

of the hop mite in greenhouses. This mite is exceptionally voracious, very fertile, and its life cycle can be synchronized with the development of the individual mite populations. By no means negligible is also the fact that the predatory mite multiplies well under laboratory conditions, from where it can be released as the need arises.

The methods of breeding the predatory mite were developed in the greenhouses of the Agricultural College in Prague-Suchdol. It will be of interest to note that a large brood of mites was raised on dwarf beans. The mites were placed among the cucumber plants either directly on the bean leaves or on balls of cotton. But it is regrettable that only enough mites were bred for the school experiments, and no enterprise in Czechoslovakia was willing to undertake this truly nonconventional breeding. More predatory mites could have been used on a larger greenhouse area, saving a larger quantity of greenhouse crops.

Within the framework of a CEMA task, the faculties of the agricultural colleges in Prague and Ceske Budejovice studied the problem of the greenhouse moth's parasites. A combined method was developed for protecting greenhouse single crops with the help of the small wasp Encarsia formosa. This parasitic wasp lays its eggs in the larvae of the greenhouse moth, and its own larvae that develop within the host kill the larvae of the greenhouse moth. In practical application the parasite multiplies in the form of eggs, 115 to 130 of which are pasted to a card, and the cards are hung among the plants.

It is worth noting that the cards with the eggs pasted to them are sent to the farms by mail. The developed method of breeding and using the parasite has been transferred to other CEMA countries as well. Under full-scale conditions, the method has been tested also of controlling the greenhouse moth in a cucumber crop with the help of entomopathogenic fungi. This is a promising method whose advantages are as follows: the action of the fungi is specific; the fungi can be cultivated on artificial culture media and stored for a long period of time; and the fungi can be applied with the same equipment that is routinely used for the chemical protection of greenhouse plants.

Seek and Find

After mites and greenhouse moths, let us return to the lice mentioned in the introduction. They belong among the principal greenhouse parasites. The well-known ladybugs are the greatest natural enemy of plant lice. The problem, however, is that the useful ladybugs begin their beneficial activity late, when the lice have already damaged or destroyed the crop. Against the lice researchers have tested the predatory larvae of the fruit moth, in combination with another entomopathogenic fungus, and obtained very good results. The predatory fruit moth is bred in the Institute of Entomology of the CSAV South Bohemia Biological Center, in Ceske Budejovice, in strictly planned quantities. The moths are transported to the greenhouses in simple plastic containers. The synergistic fungus is produced on artificial culture media and can be stored for more than six months in the frozen state.

The Joint Agricultural Enterprise in Marsova, where the experiments to biologically control greenhouse parasites were held in cooperation with our researchers, has achieved a statewide first. By means of the biological method against a complex of parasites, the enterprise was able to grow during the past two years cucumbers of excellent quality, without the use of any chemicals. Thus the enterprise is the first natural producer of cucumbers in Czechoslovakia.

As the Marsova experiment unambiguously shows, there can be no doubt that direct cooperation between the scientific research base and the agricultural enterprises is highly efficient. The contributions of science and experimental practice are, willy-nilly, the model and basis for the solution of additional problems that will permit introducing, as soon and as widely as possible, integrated methods of plant protection. Important for the wide-scale application of these methods is the fact that the Federal Ministry of Technological and Investment Development is supporting the construction of a specialized laboratory on the Chelcice JRD [Unified Agricultural Cooperative] where the natural enemies of greenhouse pests will be bred.

1014
CSO: 2402/57

ROBOTRON'S K 1002, K 1003 MINICOMPUTERS DESCRIBED

East Berlin TG--TECHNISCHE GEMEINSCHAFT in German Vol 31 No 4, Apr 83 (signed to press 1 Mar 83) pp 9-10

['Microelectronics' report by Dr Hannes Gutzer: "The Engineer's Subservient Genies"]

> [Text] "It is undignified for a proud, learned man to spend his time with slavish computations since even the dullest person could execute the computation without error using a machine." Spoken by Gottfried Wilhelm Leibnitz upon launching the construction of his computing machine in 1671. Not just the dullard but also the creatively employed engineer can draw important support for his daily tasks from the K 1002 and K 1003 programmable microcomputers. Even engineers with no computer background can readily acquire the necessary basics.

The use of programmable microcomputers can contribute to important economies in engineering work. This class of computers includes keyboard-programmable pocket and desk calculators as well as pocket and desk calculators which use a problem-oriented programming language (usually BASIC and PASCAL). The use of such computers decreases computing time to about 20 percent of that required by nonprogrammable scientific pocket calculators.

The nonprogrammable pocket calculator celebrated its 10th anniversary in 1982. The programmable version is newer, but it was on hand in 1975 when the Soyus and Apollo space vehicles linked-up in space. Programmable microcomputers make possible the generation, storage, reproduction and utilization of computer programs for calculating strengths, deformations, stresses, costs and characteristic values for a host of manufacturing processes. From their big brothers they inherit programmability, a capability which makes it possible to automatically and rapidly rerun programs stored on magnetic cards. From their little brothers they get ease of handling, simple operation, and immediate availability on the engineer's desk. The keyboard-programmable desk-top computers K 1002 and K 1003 are available in the GDR. The thermal printer available in the K 1003 not only makes hard copy of computed results but can also print alphanumeric strings and record

the dialog between programmer and computer during program development. This is of great advantage in reducing operating errors and the amount of hand-written documentation required.

Naturally, the K 1002 and K 1003 can be used as ordinary desk-top calculators. But that is like operating one's automobile continuously in first or second gear. Use of the programming feature corresponds to running in third or fourth gear, but there are certain problems in doing this.

Making Full use of Programmability

Software, or computer program development, accounts for about 60 to 80 percent of the expenditure associated with electronic computers. This means that spending is not limited to just the purchase price of the computer. In this connection, a software vendor once said with some exaggeration: "We generate software, and to be sure that it works we need that little tin box called a computer!" The sore point for the engineer is the intellectual investment. First, he has to learn to operate the computer. Second, he has to find out about existing and accessible programs. The programs of interest are purchased and used in accordance with the documentation. And, third, he has to learn to program the computer so that he can write programs to solve problems of interest to him.

In connection with the second step, the following guidance can be given. The computer manufacturer offers a functional block "Statistics" which makes the calculation of average values, deviations, random numbers and regression and correlation coefficients much easier. For simple applications, one does not have to start from scratch, rather it is efficient to simply incorporate the statistics block. Working Group PKR K 1002 of the Architectural Academy of the GDR has expended great effort in developing and offering programs for the K 1002. The second program index [1] contains over 400 programs which relate primarily to structural engineering but which also deal with mensuration, welding and economics. Use fees are small and method for computing costs is included in [1].

Of course, this does not solve the problem of "know where." Unfortunately there is no central information agency for manufacturers so a literature search remains the fall-back solution. Key periodicals in this field are the magazines NEW OFFICE MEHTODS and COMPUTERS AND DATA PROCESSING. In addition it is becoming inceasingly common for programs related to a specific technical field to be published in the trade magazines dealing with this field (for example: CASTINGS; MANUFACTURING METHODS AND OPERATIONS; STRUCTURES RESEARCH AND APPLICATIONS, and others). The information center of the GDR Central institute for Welding Technology in Halle has compiled a bibliography of program publications for the K 1002 which can be purchased [2]. For running the programs the user usually gets a program description with operating instructions and computed examples plus the associated magnetic cards.

Programming knowledge can be acquired from the operating handbook provided and from courses conducted by the computer manufacturer. The Halle Regional

Association of the KDT and the GDR Central Institute for Welding Technology jointly undertook the task of providing programming courses for the K 1002 in the fourth quarter of 1981. These courses are conceived to be for beginners. In a total of 24 hours, the "threshold of fear" of programming will be removed from engineers with no computer experience. After completing the course, the participant is in a position to write small programs himself and to quickly look up the functional details of individual instructions when necessary. In this manner nearly 300 engineers of the Halle district have augmented their training since the start of the program. At the middle of 1983 the courses will be resumed and expanded to include the K 1003 with thermal printer.

A Computer for Each Individual is not Required

Finally, a few words about organizing work around the computer. While each individual will want to keep his own program library on his desk, the computer should be secured to a cart and made mobile within the group [3]. In general the computer can still be considered as freely available when used by up to 10 engineers. Use of the computer for data acquisition and process control will not be discussed here. For these purposes, the Robotron Combine, ZFT Karl Marx City offers the documentation for connecting peripheral equipment. Beyond the applications mentioned, there are numerous specialized applications.

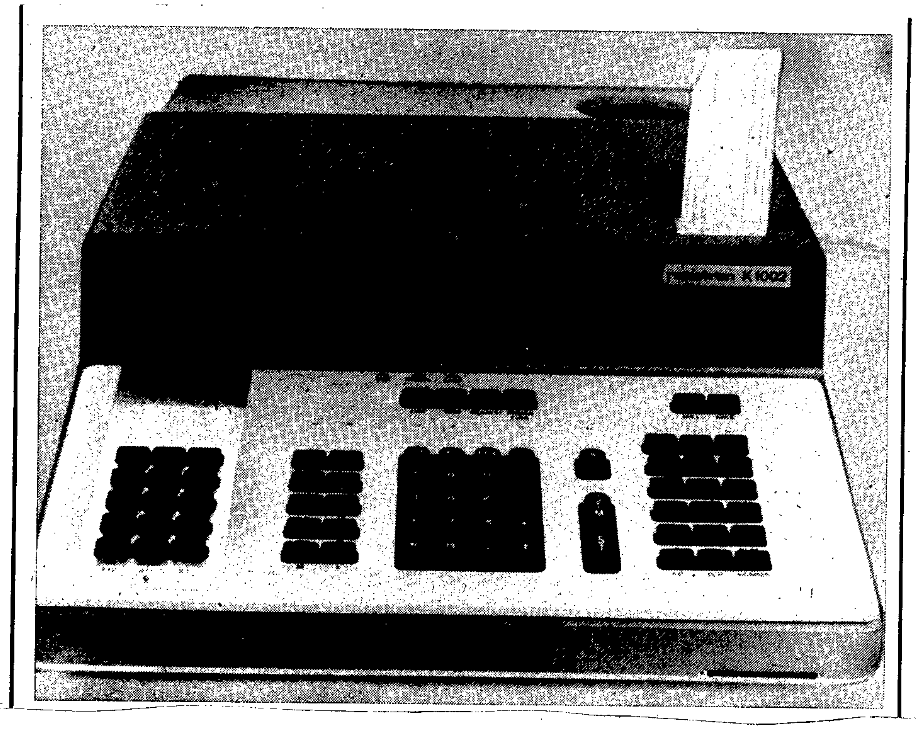


Photo Caption: The K 1002 programmable microcomputer, a modern aid for engineering work (Photo: Heine)

References :

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[2] Bibliography on the Use of the K 1002/1003 Microcomputers, ZIS Information Center in Halle, Halle 1982.
[3] K 1002 Programmable Microcomputer, Structures Research and Applications, Berlin (1981) 76.

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NUCLEAR PHYSICS IN DEBRECEN

Budapest MAGYAR NEMZET in Hungarian 18 May 83 p 8

[Article by Dr Laszlo Medveczky: "Is Nuclear Research Worth While?"]

[Text] ATOMKI, the Nuclear Research Institute of the Hungarian Academy of Sciences, is located at the head of the road leading to the Nagyerdo [large forested park] in Debrecen. The research institute based at the science school and founded by Sandor Szalay, academician, developed almost 30 years ago from the Experimental Physics Faculty of the Louis Kossuth University.

Now a tower crane is rising in the courtyard of ATOMKI. The builders are preparing the foundations of a cyclotron building that is under investment. It will be 2 years before the cyclotron purchased from the Soviet Union with the material support of the International Atomic Energy Agency will begin to operate, but the institute has been preparing for a number of years for its successful use. One research group is training for instrumental and radio-chemical research work at Dubnan. Guests from Finland are frequent visitors in Debrecen, and similarly ATOMKI research workers visit Turku, where a similar Soviet accelerator is already in operation.

Three goals guide the research activities of ATOMKI, and its research capacity consists largely of three parts: nuclear and atomic physics basic research; interdisciplinary research; and the practical application of research results.

The research work of the institute in basic and interdisciplinary research is internationally recognized. Not only do more than several thousand articles cite the results which have been published in more than 1,800 publications, but some results have also been included in handbooks and textbooks.

Today nuclear physics research is made up of observations of artificial nuclear processes, the experimental study of artificially produced isotopes, and the theoretical interpretation of observed phenomena.

The experimental work of the Debrecen nuclear researchers is being performed primarily with the help of an internally developed, 5-million volt electrostatic accelerator which has been operating reliably for more than 10 years.

In recent years, a supraconductor magnetic electrospectometer has been developed in order to make it possible to measure, in various states of the atom, one of its important characteristics, the so-called rotation. The fine particles of structure in about 25 nuclei have been studied thus far on the accelerator beams, and meanwhile new methods have been worked out for the clarification of further particles. In recent years, research in nuclear structure has been concentrated, on one hand, on the "nucleon clusters" in light nuclei and, on the other hand, on the study of the characteristics of temporary--neither globular nor strongly deformed--nuclei.

The Institute is also experiencing the trend which is characteristic of the close link and cooperation between experimental and theoretical nuclear physics. Our theoretical investigations are directed at describing the process of nuclear reactions and at the clarification of theoretical questions in certain problems of nuclear structure.

It has been observed a number of times in the history of physics that interest is concentrated from time to time on a given area. This is the case currently in atom-shell physics. For 10 to 15 years the interest of an important number of researchers and research centers has been devoted to nuclear physics, or more exactly, a new area, the physics of atomic collisions.

ATOMKI joined these investigations relatively early, and the researchers at the institute have achieved many important results--often cited in the international professional literature--in the study of the ionization of atoms by charged particles. Mention must be made of the experimental results in the ionization cross section created by lightly charged particles (electrons) and heavily charged particles (protons, and helium, carbon and nitrogen ions); the investigation of angle distribution in the X-ray radiation of ionized atoms; results indicating the ratio of various X-rays, and investigations to clarify the spectrum of electrons in their outward flight.

For the application of electron-spectroscopic methods, we built in the institute the country's first so-called ESCA equipment (for the discovery of this method, K. Siegbahn received a Nobel prize 2 years ago). With this it is possible to determine the chemical bonding conditions of surface atoms in solid materials, and the structure of surface atomic layers. With X-ray induction photoelectron spectroscopic (this is the meaning of the acronym ESCA) investigations, new results were achieved in ATOMKI on the transformation affecting corrosion influences on the oxide protective layers of various steels; on the enrichment occurring in the surface oxide layers of certain aluminum alloy components in regard to the structure of oxide layers built on the electrodes of precious metal and in relation to the chemical identification of the air pollutants of power works.

Radio carbon dating has been conducted at ATOMKI since 1978. On the basis of research jointly conducted with the Geographical Institute of the Louis Kossuth University we could make deductions on the age in which various sand dune forms were developed in the Nyirseg. The measurements shed new

light on the development of late Ice Age sand formations. By determining the age of charcoal samples taken from Bodrogkoz river beds, it became possible to establish the rate at which these basins were filled up. On the basis of bones taken from the Tiszapolgar-Basatanya Bronze Age cemetery--in collaboration with the Antiquities Institute of the Hungarian Academy of Sciences--it became possible to draw conclusions about the time of the Hungarian Bronze Age. By measuring the quantity of C-14 in the annual rings in the locust and oak trees by Debrecen, it was possible to determine the change in the C-14 content of the atmosphere as a consequence of nuclear arms experiments beginning in 1950 to the present day. With the help of the annual rings in the locust trees by Paks, it was possible to determine the C-14 zero level by the nuclear power plant.

ATOMKI and MOM [Hungarian Optical Factory] jointly developed a nuclear composition-trace detector, which is regarded throughout the world as an outstanding product.

The accelerators built through internal development, the experiments related thereto, and the planned research-development work has made it possible for the Institute to work on a development program for the manufacture, in collaboration with TRAKIS [expansion unknown], of a type of accelerator whose use will be essential primarily in agriculture and the food industry.

Various research development results of ATOMKI like the quadruple mass spectrometer or the X-ray fluorescence analyzer are expensive pieces of equipment, but their industrial use results in important economic benefit. For one of the users it has already resulted in greater savings than the investment sums it has received from the economy since the establishment of ATOMKI.

The question is frequently asked whether it is possible successfully to conduct nuclear and atomic research in such a small country like ours. Everyone knows that the dimension and price of equipment and means necessary for such research work is substantial.

The results achieved within domestic possibilities and here demonstrated show that ATOMKI is fulfilling its research goals. Its research results hold their own also when measured by international standards, and its research and development results can be directly utilized. But there are also many examples in the successful work of ATOMKI showing how the possibilities afforded by international cooperation can be used to advantage.

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TECHNOLOGY TRANSFER SITUATION, PROSPECTS

Technology Transfer Situation, Prospects

Warsaw PRZEGLAD TECHNICZNY in Polish 13 Feb 83, pp 11-14

[Article by Hubert A. Janiszewski: "Transfer of Technology: Present Situation and Prospects"]

[Text] At present Dr Hubert A. Janiszewski works with the UNIDO Secretariat (the UN organization for trade development) in Vienna. He is the chief of advisory services for import of technology (license agreements, multinational companies, supply of finished products, etc.); he is also the UNIDO advisor for policies on technology import for such countries as the Philippines, the Republic of China, Malaysia, Thailand, Algeria, Portugal, Mexico, Turkey, Venezuela, and Indonesia. Dr Janiszewski is the author of many publications on government regulation of technology import, licensing policies, etc., written in large measure for UNIDO. His most recent book, published by the Clark Boardman Co. in New York in December 1982, concerned the method of computing payment for licenses, especially royalties.

The present, continuously critical economic situation of our country, especially the insignificant growth in industrial production and the constantly increasing foreign debt, which rose from approximately $25 billion to approximately $28 billion by the end of 1982[1], increases the interest of the community and of leaders in the areas of both government and economics in problems of mass import of technology during the 1971-1980 period.

I will review only the last 2 years of discussion of this important subject; to the degree that source materials are available, however, I will try to present the scale of our technology import, particularly the contract terms, and on this basis, I will propose certain solutions that were successfully applied in other countries such as Japan, Mexico, Brazil, Spain or Portugal, countries (with the exception of Japan) similar in level of industrial development to our country.

We should profit from tested solutions in the present crisis situation for at least two reasons: to gain immediate emergency benefits and to define and begin a countrywide policy of technology import (for we will have to import technology to maintain and increase the level of technological industry and economy and we will have to make our products more competitive in foreign markets).

Table 1. Import of Licenses and Their Industrial Distribution During 1971-1980

Supplying Country	Number of Contracts	% of Total	% of Value
FRG	113	26.8	10.0
France	64	15.2	24.6
U.S.A.	44	10.4	22.4
Great Britain	41	9.7	8.8
Italy	36	8.5	14.5
Sweden	31	7.3	5.5
Japan	22	5.2	3.2
Switzerland	18	4.3	2.9
Belgium	12	2.8	1.2
Netherlands	10	2.4	0.8
Others	31	7.4	8.1
TOTAL	422	100.0	100.0
Enterprises:			
Machines, equipment	180	42.7	29.5
Transport equipment	68	16.1	22.7
Electrical equipment	46	10.9	14.8
Chemical industry	45	10.7	17.8
Electronics, Precision Equipment	35	8.3	5.5
Metal working	17	4.0	2.9
Mineral industry	12	2.8	3.8
Others	19	4.5	2.9
TOTAL	422	100.0	100.0

Status of Polish Technology Import During 1971-1980

During 1949-1980 Poland bought a total of approximately 600 licenses worth $750 million (the value of purchase prices and royalties) from the free foreign exchange area; of this total 422 licenses worth $635 million were purchased in the 1971-1980 period. To this sum we must add approximately $4.4 billion in the form of complementary imports, that is, machinery, equipment, raw materials, components, etc. Therefore the total import of licenses cost more than $5 billion, or 8 percent of total imports from this area during this period.

Another form of technology import was the so-called industrial coproduction agreements (linked, as a rule, with the purchase of a license); 90 of these were concluded during 1976-1980, with a total value of approximately $1.1 billion, 34 being with West Germany, 12 with Sweden, and 6 each with the U.S.A. and Great Britain.

In turn the import of complete installations held a significant position and in just the period from 1976-1980 attained a total of approximately $4.4 billion; the import of technical data during this time was a modest $15 million.

On the basis of the above incomplete data we may conclude that Poland during 1971-1980 imported technology worth a total of $12-13 billion, and therefore almost 25 percent of the total imports from free foreign-exchange countries, which was an unprecedented investment effort on a worldwide scale (not in absolute numbers, but with respect to total imports and national income).

I want to emphasize that I personally consider technology import as legitimate, although we may and must argue over the desirability of buying one technology or another from one licensor or supplier or another. For an impression of the extent of Poland's importing of licenses alone during 1971-1981 as compared to selected countries with a similar level of industrial-economic development, pertinent data are presented in Table 2.

Table 2. License Import (Fixed Payments and Royalties) by Poland and Selected Countries During 1971-1981 (Millions of Dollars)

Kraj 1)	1972	1975	1976	1977	1978	1979	1980	1981	2) Razem
3) Argentyna	120,0	78,0	32,04	34,9	157,9	321,5	581,8	579,9	1906,04
4) Brazylia	154,0			10) brak danych				11)	ok. 1500,0
5) Meksyk	131,0	173,5	189,6	190,1	208,2	215,3	–	–	1106,4
6) Indie	24,7	23,6	43,0	65,4	–	–	–	–	156,7
7) Portugalia	12,0	20,1[2]	–	25,3	49,4	56,8	83,9	94,2	341,7
8) Hiszpania	199,5	258,2	466,2	428,8	454,3	512,5	614,9	582,0	3516,4
9) Polska[4]				12) łącznie					750,0

1) 1970, 2) 1974, 3) 1971, 4) tylko suma łączna. 13)
Źródło: dane własne na podstawie statystyk ww. krajów. 14)

Key:

1. Country
2. Total
3. Argentina
4. Brazil
5. Mexico
6. India
7. Portugal
8. Spain
9. Poland
10. No data available
11. Approximately
12. Total
13. Total amount only
14. Source: Personal data based on statistics of countries concerned

From this it is clear that in absolute terms, other countries cited in the table, with the exception of India and Portugal, imported significantly larger quantities of technology in the form of licenses than did Poland!

We will now consider in greater detail the contract terms under which industry imported technology[2].

Information available to me from the Central Licensing Registry through the Ministry of Foreign Trade is the basis for specifying certain contract terms:

1) export limitations with respect to products under license;

2) limitations on applying trade marks to products manufactured under license;

3) limitations on the possibilities of a lateral transfer of purchased licenses outside the licensed enterprise. A perusal of Table 3 will illustrate the above universally evident limitations and contract prohibitions.

Table 3. Export Limitations in License Contracts Regarding Production by the License Holder, in Percents

Country	Complete Prohibition of Export	Export to CEMA Only	No Restrictions	No Data Available
FRG	10.4	67.5	22.1	--
France	1.4	53.5	45.1	--
Italy	--	96.5	1.3	2.2
U.S.A.	1.4	68.8	29.8	--
Great Britain	7.7	87.9	3.1	1.1
Switzerland	1.6	47.5	0.9	--
Sweden	0.3	98.5	0.2	1.0
Japan	0.3	89.1	16.6	--
Other countries	11.5	77.7	10.6	3.1
TOTAL	3.8	75.3	20.1	0.8

Source: Personal data collected on the basis of various national publications.

As is clearly evident, as many as 80 percent of the agreements contained restrictions (partial or complete) of export of licensed products, and 75 percent of the agreements permitted export only to CEMA member countries, which in itself is not bad if, first, import of technology from this direction were in similar proportions, and second, if regular import of complementary material were not stipulated.

Moreover, I would like to emphasize that many licenses were purchased for the purpose of increasing export possibilities to free foreign-exchange markets, but the data in Table 3 contradict the assumptions of the import "policy" in this area.

From an analysis of the limitations on using trade marks for products manufactured under license, essential obviously in the marketing of products manufactured under license, it seems that in 64 percent of the agreements, the licensees' rights to use the trade mark were limited to Poland (!) and

therefore there was no possibility of exploiting its value in foreign markets, including CEMA markets.

Analysis of the possibility of a lateral transfer of imported licenses beyond the license-holding enterprise is presented in Table 4.

Table 4. Limitations on Use of a Purchased License During 1971-1980, in Percents

Country	Right to Use License Restricted to Licensee	Right to Use License in Any Plant	No Data Available
FRG	30.3	59.9	9.9
Great Britain	23.1	68.1	9.8
France	29.6	70.4	--
U.S.A.	43.4	59.0	7.6
Italy	18.6	70.4	7.0
Sweden	50.0	38.1	11.9
Switzerland	35.7	42.8	21.5
Japan	53.8	30.8	15.4
Other countries	41.8	50.6	7.6
TOTAL	33.6	57.8	8.6

Source: Personal data collected from various national publications.

As is evident, more than a third of all agreements did not anticipate or completely excluded the possibility of applying the technology outside the plant of the licensee, which in a fundamental manner limited the range of technology transfer in specific associations and on a national scale.

In this context it should be noted that in 85.4 percent, and therefore in 508 license agreements, the licensees of our country had no right to issue sublicenses. A comparison of certain conditions of technology import before and after 1971 indicates that before 1971 approximately 60 percent of the licensees had the right to use the technology outside the plant of the licensee, but after 1971, that number dropped to approximately 55 percent.

This information forms a basis for the thesis that Polish licensees could not adequately exploit their position, often monopolistic, in Poland, or their position, privileged in many cases, in the CEMA market.

Recapitulating, we may say that to the extent that technology import, in its various forms, significantly promoted a decided modernization of national industry (or at least of certain of its subsectors) to that extent, the generally disastrous contract conditions in large measure destroyed the effects achieved, especially from the aspect of accelerating an increase in exports first of all to free foreign trade markets.

I should like to stress once again that I do not have access to all the factual data in the form of complete texts of license agreements (and others)[3], which would make a full analysis of conditions of technology import possible. It seems, however, that the remaining conditions, particularly those described as restrictive or limiting are also universal, and in effect negative. It would be worthwhile to undertake a complete analysis which could encompass all agreements made through 1971. Such an analysis should be carried out from the point of view of:

--restricting raw materials import, replacement parts, etc., by licensors (so-called tie-ins),

--limiting the licensee in the application of his own or competitive technological solutions (so-called tie-outs),

--limiting the volume of production,

--fixing the selling price of licensed products (e.g., in foreign markets),

--the form, the method, and the amount of license payments.

Information on the amount of technology imported by Poland is a basis for the view that it would be desirable to introduce direct regulation of this import in Poland which, I am convinced, would in a short time bring positive and immediate results approaching those attained by other countries.

Such an analysis should serve only to formulate an objective and complete picture of technology import by Poland and of contract terms for the purpose of constructive activity in the sphere of: a) verification of the what occurred in cases where this is possible and desirable; b) arriving at decisions that would prevent repetition of past mistakes.

I should like to emphasize most strongly that the situation defining the scope of these contract terms for technology import to Poland is no different from the situation in countries such as Mexico, Brazil, Spain, Portugal, or the Philippines before direct regulation of technology import was introduced. These unprofitable conditions were the basis for decisions by governments of those countries to introduce regulation in this sphere.

Some Solutions in the Sphere of Technology Import Regulation Applied in Other Countries

Regulation of technology import by governments is not a new phenomenon. Its beginnings go back to government interventionism in various spheres of economic activity, including attempts to limit monopolistic actions in the 19th century and in the beginning of the 20th century.

The Sherman and Clayton Anti-Trust Acts (with subsequent amendments), Articles 85 and 86 of the Roman Tracts, or the guidelines of the Japanese Commission for Trade serve even now as a basis for regulating contract terms pertaining to license transactions and technology transfer in many countries of the world.

In developing countries, the 1970's were a period during which governments introduced regulation of technology on a massive scale. This action was started by India as early as 1956, and in Latin America by Colombia, which in 1967 created the Commission for Royalties, a special agency for technology import. These examples were followed in turn by Argentina (1971), Mexico (1972), the Andean Group (Peru, Ecuador, Colombia, Venezuela, and Bolivia), Brazil, and Portugal (1977), Spain, Republic of South Korea (1967), and the Philippines (1978), Malasia (1975), Nigeria (1979), and certain other countries.

All these countries introduced import technology regulation through appropriate acts or administrative decrees for the purpose of:

--eliminating contract terms and agreements on technology import that were unprofitable or harmful to the national economy;

--decreasing the general cost of technology import;

--revising contract agreements already concluded (Mexico, Nigeria, the Andean Group and Argentina);

--strengthening the selling position of local commerce, especially in negotiations with international corporations;

--directing technology import to priority subsectors of the economy;

--coordinating technology import with the country's own research and development;

--conducting systematic studies of the problems of technology import and its effect on the economy.

As is evident, the purpose which the governments of these countries set for themselves were twofold in character: first, they were immediate, short-term purposes concerned with improving contract terms and decreasing cost; second, they were long-range, and therefore pertained to developing a technology policy on a national scale aimed at achieving relative technological independence.

As many as 80 percent of the agreements contained restriction (complete or partial) of export of licensed production, and 75 percent allowed export only to CEMA countries.

It is not my purpose to discuss in detail all the solutions applied in these countries; I should like, however, to call attention to their common features:

1) introducing legal regulation that set minimum terms on which technology import can take place;

2) introducing the obligation to register all agreements concerning technology import;

3) creating special government agencies for registration, evaluation, and acceptance of agreements for all technology import;

4) granting of special authority to these agencies for carrying out their tasks.

A critical evaluation of the results of the regulations introduced in these countries is worthwhile, and should answer the questions as to whether direct regulation of technology import was effective, how long it took to achieve positive results, and wbether there were negative repercussions and what kind these were.

I will begin the evaluation by presenting the position of the suppliers of technology, basing the evaluation on information obtained from international corporations, mainly American, Japanese, and West European.

In the interesting quarterly, LES NOUVELLES, which is a forum for licensors[4], detailed evaluations of technology import have been made for almost 10 years in certain countries. The tone of this evaluation and the views expressed have undergone significant evolution in this period, and at present they can be summarized as follows: "Government regulation of technology import, as it is practiced in certain countries, is a necessary evil for licensors, but much depends on the interpretation of the provisions of specific legal acts regulating such import and the effectiveness of the regulating agencies in the specific countries. There is no doubt that it was introduced for the purpose of improving the negotiating positions of local trade and eliminating flagrant contract limitations; at the same time such regulation affirms basic principles within the framework of which we hope it will be possible to conclude transactions advantageous to both sides."[5]

In turn, from the point of view of the countries that introduced regulation, we may note the following positive results:

1) decided improvement in technology import contract terms, specifically: complete or practically complete elimination of all restrictive clauses, acquisition of broader export rights for licensed products, decided decrease in duration of specific agreements;

2) decrease in total cost of technology import, including reduction of fixed payments and royalties, and thereby improvement in the trade balance (balance of payments);

3) elimination of superfluous tie-in import of components, replacement parts, semifinished products, and raw materials;

4) directing of technology import to the priority subsectors of the economy;

5) strengthening the negotiating position of the licensees;

6) insuring a better coordination of technology import with local research and development work;

7) accelerating the development of export of indigenous technology.

To illustrate some of the stated results of technology import regulation, I will quote a statement of the past president of Mexico, L. Echeverii, in the serial "State of the Nation Reports" in which he said: "Thanks to the laws on technology transfer, we have attained significant savings in cost of technology import, amounting to approximately $50 million in 1974, $90 million in 1975, and $110 million in 1976, and an increase in the total number of agreements concluded."

It should be noted here that Mexican law regulating technology import is retroactive (as is that of Nigeria and other countries), and therefore encompasses all agreements on technology import in force on the day of its adoption. In the period 1973-1975 the Mexican Register of Technology Transfer verified approximately 4000 "old" agreements worth a total of approximately $700 million and approximately 1500 agreements concluded after the adoption of the law on regulating technology import[6].

In turn the Registrar of Technological Contracts in the Ministry of Trade of Spain indicates that 8-year enforcement had the following effects:

1) made it possible to stabilize the correlation between technology import and local research and development work for the purpose of promoting local work of invention and development at the level of individual enterprises and on a countrywide scale as well;

2) the advisory role of the register decidedly improved the negotiating position of Spanish licensees and resulted in a radical improvement in contract terms;

3) the process of evaluating contracts, and their registration led to eliminating restrictive clauses with a negative character in 98 percent of the concluded technology import agreements.

Annual reports of the Portugal Institute of Foreign Investments, which evaluates and accepts all agreements for technology import (as well as foreign investment activities in that country), clearly indicate that since the Institute was created, not only were decidedly lower prices and better terms of payment for this import achieved, but the cost of royalties was also significantly decreased (e.g., average royalties in the pharmaceutical industry were approximately 11 percent before 1977, and presently dropped to 3.5-4.5 percent of the selling price). Restrictive clauses, which were at one time universal, were eliminated from contracts concluded after 1977[7].

It should also be noted that the improvement of contract terms and decrease in the cost of technology import, which occurred in all the countries discussed and compared here, affected agreements between independent enterprises as well as agreements between dependent enterprises or agreements in which foreign capital participated. This is essential since the criteria for evaluating agreements on technology import between dependent enterprises (with more than 50 percent foreign capital) are significantly stricter as a rule (e.g., complete ban on payment of royalties or setting them at a maximum level of 1 percent of selling price, etc.).

Similarly profitable results of technology import regulation were noted in all countries that introduced such regulation in the past.

Possibility of Introducing Technology Import Regulation in Poland

Information on the size of technology import by Poland makes me think that it would be desirable to introduce direct regulation of this import in Poland; I am convinced that in a short time it would have positive and immediate results approaching those that other countries achieved. In my opinion, such regulation should cover the following transactions (for import from free foreign-exchange countries and CEMA countries):

--purchases of licenses, patents and know-how;

--purchase of complete industrial units;

--purchase of technical documentation of all kinds including purchase of computer programs (software);

--service agreements of all types and franchise agreements;

--agreements on industrial coproduction of all types;

--agreements for forming multinational companies in Poland;

--agreements on technology import (as above) made by Polonia enterprises and multinational companies with headquarters in Poland.

Moreover, regulations should cover all agreements on technology import in force on the day such regulation is adopted and relevant legal acts are promulgated.

"Retroactivity" is justified, it seems to me, first, to correct and verify contract terms in some cases and by this means to save on foreign exchange through modifying and decreasing the terms of payment, and second, because of the positive results of such action in other countries.

How should the introduction of such regulation in our country be planned?

First of all, it would require preparation of an appropriate bill in the Sejm on the motion of the minister of foreign trade (the decrees of the Council of Ministers have a tendency, unfortunately, to change frequently, and this is not in the interest of either foreign trade or of that sphere of the economy that has foreign contacts); such a bill would encompass at least:

1) the duration and type of transactions covered by the regulation;

2) standing terms of technology import in very general way (an adequate study of such laws in Mexico, Portugal, Spain, Brazil or guidelines of the Ministry of International Industry and Commerce in Japan should precede the preparation of such a law);

3) creation of an appropriate institution with powers of attorney to regulate technology import on a national scale (e.g., a plenipotentiary minister of foreign trade with a small expert staff);

4) introduction of the obligation to deposit all agreements, "old" and new with the designated office of the Plenipotentiary for Regulation of Technology Import either by the Polish licensees or by the foreign suppliers of technology.

I would like to state emphatically that such an office or staff would not replace any potential licensees or enterprises in foreign trade in the selection of a technological alternative, nor would it make a decision on the purchase of a specific technology. Its role would be:

1) supervising and rendering an opinion on contract terms of newly initiated transactions;

2) revising contract terms of concluded transactions and rendering an opinion on the terms of planned or actually negotiated transactions;

3) conducting consultations for Polish licensees and foreign trade enterprises;

4) maintaining a complete registry of full texts of all transactions concluded on technology import;

5) maintaining contacts and exchange of information with institutions of a similar type in other countries and international organizations such as the CEMA, the EC, and the UN;

6) carrying on informational-instructional activity in the area of problems of technology transfer for industry, the scientific research facilities, and higher institutions of learning;

7) preparing information-science materials on the topic of technology transfer for use in strategy planning at the ministerial and national levels.

The scope of such an agency, which might be called the National Bureau for Technology Import, could also be extended either at the time of its creation or as normal activity develops. It should be noted that similar institutions in other countries (registration, rendering opinions, consulting, information science, etc.) collect the designated payments (also in foreign currency), which makes it possible for them to be self-financed without requiring additional financing from the budget.

I trust that my observations and proposals, based on practical experience acquired in working in many of the countries mentioned in this article, will meet with a positive response on the part of both the readers and administrative leaders. The proposed solution has two principal virtues: first, it has been proven practically many times, and second, it has rapid, concrete effects, and those in a sphere that is at present most critical for the economy since it has to do with foreign payments. We have very little time to reach a decision.

FOOTNOTES

1. "Financial Times" December 1982.

2. For the purposes of this article, I use the concepts of license and technology interchangeably, although the latter meaning is broader.

3. According to information available, no institution in Poland has a complete collection of all license agreements concluded by industry and the Department of Foreign Trade.

4. LES, the Licensing Executive Society, has an individual membership of approximately 4000 managers concerned with technology transfer in the whole world, representing approximately 90 percent of the world technology exchanges.

5. Larry Evans, from "The Standard Oil Co.," Les Nouvelles, XII, 1980.

6. During 1974-1976, the author of this article was an advisor to UNIDO at the Mexican Registry of Technology Transfer.

7. Annual Reports of IIE, 1979.80 and 81; the author was an advisor to UNIDO during 1977-79 at the Institute of Foreign Investment in Lisbon.

Technology Transfer Enterprise

Warsaw PRZEGLAD TECHNICZNY in Polish 13 Feb 83 pp 15-17

[Article by Jan Monkiewicz and Stanislaw Jankowski: "Casus ZORPOT"]

> [Text] The following text, a kind of "case study" presenting a way to export success for the Task Groups of Centers for Organizational and Technological Expertise and Progress [ZORPOT], might well be an occasion for more general reflection on the prospects of expanding our export of scientific-technical achievements and technical services. (Editor)

SIMP [Association of Polish Mechanical Engineers and Technicians], initiating expertise activity in organized forms in 1957, was the first scientific-technical association to join the Main Technical Organization which proposed and brought about an entirely new form of activity to meet the acute needs of the national economy.

Formal legal bases for expertise activity in the economic sphere were created by Resolution No 58 of the Council of Ministers on 9 February 1961 in order to improve cooperation between government organs and the Main Technical Organization and the technical associations belonging to it, and subsequently to implement orders of the Ministry of Finance and the State Price Commission.

By the end of 1973, the Task Group of Experts of SIMP issued approximately 3,000 experts' reports valued at approximately 15 million zlotys. The value of one such report therefore averaged approximately 5,000 zlotys. During this period the number of experts increased to 1,654. The 22d General Assembly of Delegates of SIMP was held in 1972. The principal direction of the association's activity is summarized in the slogan: "SIMP is the expert in the realm of building and use of machines and tools." The need was stressed for strengthening the activity of experts and elevating it to the rank of one of the leading areas of activity of SIMP. To increase the participation of the association in the strengthening of the national economy and development of new technology, it was resolved:

--to develop a broadly conceived technological-organizational consultation service;

--to render service in the area of starting organizational-technological work, and exchanges for technological progress, scientific-technical information, etc.

To bring into being the broadly conceived services in the area of technological and organizational expertise, on 1 January 1974, the Administrative Board of SIMP created an enterprise called, Task Groups of Centers for Organizational and Technological Expertise and Progress (ZORPOT) which was to continue the activity of the Task Group of Experts and Office for Organizational and Technological Progress.

In 1975 there was an internal reorganization of ZORPOT. Eight Centers for Organizational-Technological Expertise and Progress were established (in Bailystok, Katowice, Lublin, Poznian, Rzeszow, Szczecin, Warsaw, and Wroclaw--one center per macroregion), to which regional affiliates in Bydgoszcz, Gdansk, Kielce, Koszalin, Krakow, Lodz, Olsztyn, and Zielona Gora belonged. The number of affiliates was set on the basis of real need in the given region for the specialized services of ZORPOT.

The scope of activity of ZORPOT was very broadly defined. It encompasses both the classical consulting-engineer services and strictly productive activity. At the same time it also includes activity in the area of promoting technological progress in both direct and indirect forms. It includes the functions of POSTEOR [promotion of innovation], professional project bureaus and individual production units. It seems that such a wide definition of the scope of ZORPOT activity creates the possibility for maximum flexibility of activity, which--as might be expected--is the source of all successes attained by this organization.

Export Activity of ZORPOT

From the beginning of its activity, the administration of ZORPOT were eager to undertake work on commission from foreign contracting parties. The principal motivation was being tested professionally against foreign competition. The first contract of this type was awarded on 1 September 1974 through the Polish Foreign Trade Company [PTNZ], Elektrim, with a Greek contracting party

for designing two saltwater reservoirs with hypochlorate for the Rodos power station. Jointly in 1974-76 four foreign contracts were awarded, totaling 1.2 million zlotys. Subsequent years brought increased growth in both quantity and value of contracts (see Table 1).

Table 1. Export Activity of ZORPOT (Direct and Indirect Export)

Year(s)	Number of projects	Value [in zlotys]
1974-76	4	1,189,031
1977	10	15,242,685
1978	21	14,565,847
1979	44	64,065,298
1980	59	48,904,660
1981	27	50,883,958
Total ZORPOT export in 1974-1981	165 projects	194,861,479 zlotys
Area II--	76 projects	102,798,480 zlotys
Area I--	89 projects	92,052,999 zlotys

Source: ZORPOT data

ZORPOT exports in 1974-76 represented scarcely 0.5 percent of the enterprise income; in 1981 they represented 23 percent.

In the first phase of its export activity, ZORPOT provided exclusively consultative services, designed projects and planned construction, did expert reports, investigations, and analyses. This is still the basic part of its export work. The outstanding services of this type include:

--developing the design of a technological-operational compressed-air installation for the Bokaro Power Station in India;

--experts' report on flow compressors for the Italian firm, Pignone;

--development of the technology of producing hydraulic servo-motors for the West German firm, Kleine;

--experts' reports on the state of the technology of installing a hydraulic station for unloading cement barges for the Swedish firm, Kockums;

--selection of a boiler for a sulfuric acid installation in Bitterfield, West Germany;

--analysis of the durability of pipelines in a Belgrade sugar factory;

--evaluation of the quality of 1862A sheetmetal and steel castings for the West German firm, Schloeman-Siemag;

--evaluation of the quality of steel castings for Eleldramia Yatugan in Turkey;

--initial studies for the construction of a factory for mine machines and tools in Algeria for Sonarem, Algeria;

--technical services for Sonarem, Algeria, in the area of supervision of use of deposits of iron ore, phosphorites, and other raw materials; supervision of proper working of mining machinery and tools.

Gradually, however, the range of ZORPOT exports became broadened to include services of experts, service and export of complete industrial installations. The last element should be stressed especially since it seems that ZORPOT applied a very original marketing strategy here. Seeking its own place in this difficult market and taking into account its specific kind of activity, ZORPOT settled on supplying small production establishments that use simple, proven technologies adapted to the conditions of poorly developed countries. These are mainly establishments that produce:

--tools for mechanics and for farms;
--metal products;
--gardening tools;
--building hardware and locks;
--rivets, nails, and wood screws;
--nuts and bolts;
--windmills;
--manual machine tools and artisans' tools;
--plumbing fixtures, etc.

The list of offerings actually includes 60 different establishments of this type. In addition to the services listed, ZORPOT renders technical services in the form of supervision of installation and starting up of industrial plants, pipelines, nondestructive investigations prior to bidding on production and technical services in the areas of:

production of goods such as:

--technological systems, including automatic systems with electrical or pneumatic controls;

--technological instrumentation: dies, cutters, machining instruments, molding forms, etc.

--electronic measurement and control instruments;

technical services such as:

--lathe and milling operations;
--grinding of openings, shafts and planes;
--thermal and thermochemical forming;
--aluminum anodizing;
--steel blacking;
--screen printing;
--electronic assembling.

[In box] ZORPOT export in 1974-76 represented scarcely 0.5 percent of the enterprise income; in 1981 it represented 23 percent.

Most of the ZORPOT exports thus far have been in the form of intermediate export (such as subcontracting for export contracts of other enterprises), but the proportion of direct export during 1974-81 increased steadily so that it attained an overall value of approximately 40 percent of total export.

The following are some of ZORPOT foreign clients:

--Sket, Magdeburg, East Germany
--Aviaexport, USSR
--Sonelgaz, Algeria
--Enrico Eng. International, Milan, Italy
--Brabender Resultest, West Germany
--Omnitest, West Germany.

It should be noted that of 167 bids made by ZORPOT in 1974-81, 18 were accepted, a success ratio of 10.8 percent, and therefore a good average.

Crowning the export ambitions of ZORPOT is the granting on 12 June 1982 of concession No. P/13 for conducting independent activity in the area of export of scientific-technological achievements and technical services to markets of second-payment countries. This concession includes import of materials and tools needed in export.

It is worth emphasizing that this is the first concession in this area granted by the Ministry of Foreign Trade. This is good evidence for the operating efficiency of the enterprise.

Prospects for Development of ZORPOT Foreign Operations

Export of technical services in a wide range is, in the view of the administration of the enterprise, the main direction for its expansion in the 1980's. It is anticipated that by the middle of the 1980's the value of export will be approximately 60 percent of the value of all services rendered by the enterprise. The strategy of ZORPOT expansion is clearly defined. Its main area of activity will be poorly developed countries, and the basic exports will be simple, standard technology adapted to the low technical development of these countries and their limited outlets. Broadening its consulting activity, the enterprise has already reached the stage of opening the finishing unit that will be concerned with completing and exporting small production items designed for buyers in developing countries. All told, ZORPOT worked up bids for more than 120 small establishments for the production of various elements. These are mainly manufacturers of windproof lanterns, small oil stoves, locks and fasteners, tin implements (buckets, bowls, etc.), manufacturers of wheelbarrows and carts, galvanizing plants, manufacturers of simple agricultural implements (hoes, machetes, axes, hammers, pickaxes) etc.

This direction of ZORPOT activity is exceptionally original and promising since foreign competition in the area seems to be weaker.

At the same time, considering the scale of the material offered, the financial strength of the exporter measured by his ability to offer the buyers investment credits will be of less significance in the competitive struggle. This is one of the Achilles heels in our export of technological know-how in the form of complete industrial installations; at the same time, it is an important advantage for exporters from highly developed capitalistic countries. The export strategy selected by ZORPOT seriously limits the effect of this factor, transferring the burden of competitive struggle to prices, terms and quality of technological solutions.

What of the Future?

The analysis presented seems to be convincing evidence that in its relatively short activity ZORPOT achieved undoubted export success. It broadened the export offerings of the country and provided additional employment to a large body of engineering-technical personnel. The question then arises as to the sources of these successes and as to the possibility of others taking advantage of this example of procedure.

It seems that the key to the successes of ZORPOT is its original type of activity that breaks through the export anti-incentives that flow from the functioning of the national economy. Supported mainly by general funds, ZORPOT was able to convert "bad" money into "good." That which was impossible to accomplish in the parent institutions employing specialists (through additional emoluments) became possible and real in ZORPOT. We note that this was also a basis for the successes of POSTEOR during the period of its innovative activity. Therefore the first concern is to break through the wasteful, debilitating effect of the financial system now in force.

[In box] ZORPOT settled on supplying small production establishments that use simple, proven technologies adapted to conditions of poorly developed countries.

Another very important element is basing activity on task terms created ad hoc. This makes it possible to select true specialists from various fields for these teams, thus making the bid more complex, and therefore more attractive. This is very important in light of the tendency toward ever increasing specialization of design offices, research institutes, and production units. The same basis gives ZORPOT the ability to organize virtually any number of working teams, and thereby makes its working potential more flexibly adaptable to orders. The only restraint is the effective limits on emoluments for experts and specialists and the need to obtain releases for this work from the original employer.

An important premise of the ZORPOT successes seems also to be the actual selection of the strategy of export expansion and its independence from state

administration, which after all also increases its credibility as an independent consultant in the eyes of foreign clients.

It seems that the developmental model of ZORPOT may be profitably copied by other organizations such as NOT [Main Technical Organization], PTE [Polish Electrical Society], etc. The first step in this direction is the formation of a Society of Polish Consultants. Also, the present economic conditions will create a favorable social climate for this type of activity.

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COMPUTER DEVELOPMENT, SITUATION IN REFORMED ECONOMY

Warsaw NAUKA POLSKA in Polish No 4, Apr 82 pp 69-73

[Article by PAN Information Science Committee: "Information Science in Poland's Reformed Economy"]

[Text] Introduction

Regardless of the current crisis, dissemination of information science in Poland is an objective necessity. The only other choice would be to join the group of backward countries with no potential for successful economic competition, whose chances for economic cooperation are reduced.

Success of currently-implemented economic reform, irrespective of its ultimate format, is related to many diverse factors. One is the quality of information-science systems in the national economy as a whole and in its particular components. In order to achieve their objectives, modern information systems must be assisted by technological resources of information science. It is disquieting that broadly understood information science is unprepared to accomplish the tasks of the reform.

At this time, Poland is CEMA's hindmost country with regard to dissemination of information resources and the pace of application of new computerized-information measures.

Table 1. Numerical Breakdown of Computer Equipment in Europe's Socialist Countries

Country	Number of installed computers (in units)	Including: microcomputers
Poland*	1,900	1,200
Soviet Union	11,000	-
East Germany	2,600	2,000
Czechoslovakia	1,700	600
Hungary	900	350
Yugoslavia	1,600	-

*In keeping with the GUS [Main Statistical Office] classification effective in Poland, "computer" ranking is given also to obsolete digital computers, installed nearly 2 decades ago, many times less powerful than modern microcomputers.

This claim can be illustrated by a numerical analysis of operating computer equipment in European socialist countries in the late 1970's.

If this table is supplemented with an analysis of generally used quantities such as the numbers of computers per 1 million persons or the number of computers per 100,000 of employees, the above contention will be even more clearly substantiated.

Economic development is increasingly preconditioned by economical management of resources (raw materials, energy, labor force). In effect, those processes in the production and distribution of goods are the most effective which most efficiently and rapidly take advantage of available economic data by means of intensive application of the methods and resources for information processing.

Because of widespread application of low-cost microelectronics (as digital control components), it has become necessary for manufacturers to infuse industrial manufactured goods with elements of digital automation (the alternative being a total loss of competitiveness). Consequently, computerization should constitute one of the state's principal objectives even in a critical period. If computerization is halted at this time, it will be impossible in approximately 10 years efficiently to exchange information, take part in commerce and international division of labor, or conduct genuinely profitable export activity.

Current Status

A clearcut connection between the general policies of economic and social advancement and a program or programs, for development of computerization was never established and is still missing in Poland.

Currently operational information systems and, in consequence, computerized information systems installed or about to be installed at this time are geared toward supporting a highly centralized command-distribution system.

The absence of a policy on computerized information developments resulted in a de facto placement of high taxes, both direct and indirect, on all users of computerized information in Poland. Mechanisms are at play that produce disincentives on the products and applications of computerization, owing to unfavorable ratios of prices of hardware and computer products versus the price of direct labor.

An assessment of the Polish computer industry in 1971-80 indicates that no governmental body was actually given responsibility for correct development in applications of computerization. Its distinctive feature was no correlation between the development of software and the manufacture of equipment. Directions for development were staked out by more or less arbitrarily determined indicators rather than by technological progress and end-user needs.

Beginning in 1975, applications of computerization were artificially slowed down in Poland. Nowhere outside Poland was a regression registered in the

number of new installations. The assessment in question was submitted in May 1981 by a team headed by Prof Antoni Kulikowski appointed by the ministers of science, higher education and technology, and machinery industry. It was also presented in a report prepared by the secretariat of the Committee for Computerization.

Decreasing computer production will soon lead to reductions in installed computer equipment because deliveries will be insufficient even for simple replenishment of the stock. Discrepancies between requirement for large and medium-size computers and computer production are shown in Table 2.

Domestically manufactured computers are of poor quality, which results in their low reliability and extended stoppages due to malfunction. Computers are supplied improperly, in so-called frame configurations. In consequence, in relation to expended outlays, efficiency of computerization is low.

Table 2. Differences Between Computer Requirement and Production

Year	Computer requirements reported by ministries (in units)	Computers delivered (in units)
1976	-	121
1977	101	70
1978	73	60
1979	90	51
1980	87	27

Important omissions recur in the methods of preparation and implementation of computerized-information projects. Existing organizational structures lack the capacity to meet user needs in a comprehensive manner (especially in counseling, deliveries, and servicing provided in combination). For instance, the low level of computerization in bank transactions causes tremendous losses on account of needlessly prolonged financial operations, which is particularly sensitive in the servicing of international transactions.

Shortcomings in personnel training rank among the principal causes of this state of affairs. Graduates of most colleges have no opportunities in the course of their studies to become acquainted with proper uses of computerization devices. Science centers and the school system are, for the most part, well below the average national level in computer equipment. A significant increase in the cost of computer services, triggered by the initial stage of economic reform and compounded by reductions in college budgets, has drastically diminished the modest possibilities of providing computer training to students.

If the country's backsliding in computerization is not halted, Poland will face the threat of a total collapse of its existing technical and human computerization base which will geometrically increase the cost of, or even prevent, restoration of this base in the future. It is true that the present structures set up to provide supplemental servicing to users have failed

to meet the expectations, however, the observable tendencies to eliminate them offer nothing in their place.

It is conceivable that, under the pressure of other needs regarded as a higher priority, we will give up on continuing the country's computerization. That decision would, however, be disastrous in its results. Prolonged isolation from active contact with advancement in this field is tantamount to complete annulment of our achievements and accumulated experience to date. It would entail the necessity of starting afresh after a while, with much higher barriers to overcome.

Computer Science in Economically Reformed Poland

In order to enable the reformed economy to take advantage of information science methods, it is necessary at this time to initiate measures of organizational and economic nature to halt the collapse of computerization and streamline its development and utilization.

Certain decisions that can be suggested will permit ad hoc uses of existing potential, considering that, regardless of the weaknesses of Polish computer science discussed above, there exist untapped possibilities to harness a number of computer centers with their professional staffs to specific projects of particular importance in the period of economic reform.

Of special concern are the following topics:

--establishment of an information mechanism to initiate streamlined coproduction linkages which simply do not exist at this time, covering entire manufacturing cycles for a product, and based on local computer centers and, during an early period, on the vocational activization fund, along with possible launching of raw materials and coproducers exchange markets, and of supported employment opportunity instrumentalities;

--shortages of goods and the need for state control combine to create opportunities for socially acceptable consignment sales which, bolstered by the tools of computer science, will make state control much more tolerable (while greatly reducing trade costs at the same time). Consignment sales [mail-order sales] are in most cases, even when there is an abundant supply of goods, the cheapest and most convenient form of purchase for customers;

--new mechanisms for price setting and financial management of enterprises require rapidity of response, which can be greatly facilitated by simple computerization methods. In such cases, even in the early phases, the necessary computerization input could be financed from vocational activization funds.

The government should be able to influence determinations of strategies and implementation of computerization in the country. This is indispensable, especially at a time when computerization is endangered to the extent observable at this time. This is also why the computer science community is

calling for the establishment of a State Computerization Agency, a body adjunct to an appropriate unit within the central administration and endowed with a requisite scope of authority. The agency would impact on a community of independent and self-financing computerized information centers solely by means of such economic mechanisms as taxes, customs duties and the like. It is essential for the agency to represent overall national interests in its relations with economic organizations, rather than being a representative of a single branch in its relations with the state.

An additional instrument of control should be provided by governmental agreements with enterprises, concluded for the sake of such fields as health service, culture, and education, i.e., those unable to self-finance, yet deserving, for societal reasons, to be kept supplied with the resources and methods of computer science.

Implementation of the government's adopted developmental policy will require precisely formulated scientific research in computer science, which would be beyond the financing potential of an independent enterprise or even an enterprise association. In this setting, such research should be subsidized by the State Agency for Computer Science. The agency should have a major influence over formulations of guidelines for cooperation under the international division of labor within the framework of MKETO, CEMA, and other international organizations.

The following among economic issues in computer science are in urgent need of solutions:

--computation of costs of computerized-information services, including a solution to the problem of turnover tax assessed on information services, which tends to magnify improper price ratios constituting an economic barrier to applications of such services as a component of economic and technological progress. Because of price ratios which are not conducive to economies in manpower, actually fostering applications of nonintensive forms of technological and economic progress, particularly visible in the field of computer science, it is advisable to grant preferential treatment in taxation to computer-science users in direct proportion to outlays expended by them for this purpose;

--it is necessary for the state budget to allocate outlays for subsidizing new applications in computerization (covered by the governmental plan for development of computerization), chiefly affecting the nonproduction sphere, or for subsidizing substantive applications in the production sphere; in the latter, case, however, lower interest rate on credits or credit cancellation should be applied once societally important outstanding practical results are achieved;

--considering that in turnovers with the first payments area [socialist countries], technical resources for computerization balance out at a ratio of 3 to 1, advantageous to Poland, while domestic production of such equipment is not comprehensive, it is necessary to additionally finance (out of a

portion of above-mentioned financial surpluses) of selected purchases of computer equipment in the first payments area (those included in plans). This additional financing should reduce book values of purchased equipment, thus becoming a substantial preference for monitored purchases in education and health service;

--under a projection extending over the next few years it is necessary to bring about a major reduction in the prices of domestically manufactured equipment by rearranging production cycles of computer coproducers, selection of appropriate production scales, and consistent specialization;

--it is necessary to institute an economic system which would permit actual support of the economic reform by computerization. This involves indispensable applications of cost effectiveness calculations to make decisions affecting computer-science directions of development.

The above summary presentation does not cover all of the problems impinging on the place of computer science in a reformed national economy. It presents the community's views of principal issues connected with the problem under discussion. In particular, we wish to emphasize the fact that failure to properly estimate computerization problems can result in adverse effects on implementation of the reform. In order to meet the requirements of the reform it is necessary to insert substantial alterations in existing systems for the management of computer science. The computer-science community declares its readiness for cooperation in this regard.

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POLAR RESEARCH, COOPERATION DESCRIBED

Antarctic Biological Research

Warsaw PAP DAILY NEWS in English No 103, 26 May 83 p 2

[Text] Preparations are under way for the second biological experiment--SIBEX--in Antarctica which will take place during the Antarctic summer of 1983/84. At that time the Polish expedition on the research ship Professor Siedlecki will stay in the western waters of Antarctica.

SIBEX is part of a big international scientific programe BIOMASS which deals with biological research of marine ecosystems and Antarctica's resources.

Poland has much experience in squid research. The scientific achievements in this field put Poland in front position among the member states of the Antarctic agreement.

Polish squid expeditions in the mid-seventies obtained valuable findings. Research of squid are led by Polish sea expeditions which are aided by the Arctowski polar station.

Polish-Brazilian Polar Research

Warsaw PAP DAILY NEWS in English No 94, 13 May 83 p 4

[Text] A group of a dozen or so Brazilian researchers is expected to come to the Polish Arctowski polar station in the western Antarctic in the summer of 1983/84 to carry out natural research on King George's Island.

Brazilian researchers will participate in research at the Arctowski station within a broader program of Polish-Brazilian polar cooperation. Brazil, which has developed polar research in recent years and applied for membership in the Antarctic treaty, put forward a proposal for Poland to closely cooperate in this field to make use of Polish experience in polar research.

A Brazilian maritime biological expedition carried out studies in the western Antarctic in 1982/83 in areas which have been explored by Poland for many years. The Brazilians are interested in Polish scientific, technical and organizational consultations on maritime expeditions and construction and operation of polar stations.

Polar Research Cooperation

Warsaw PAP DAILY NEWS in English No 104, 27 May 83 p 15

[Text] The presidium of the Polish Academy of Sciences at its meeting here today pointed at the necessity to develop broader international cooperation in polar studies, especially with the Soviet Union and the states of South America. Great importance will be attached to enlarging Poland's participation in research carried out in an international framework.

The Polish polar research program, limited to a minimum because of the economic situation of the country, places major emphasis on the continuation of work by the Polish polar stations and on participation in international research programs. High costs and withdrawal of many foreign partners made it necessary to give up planned geophysical expeditions to the Greenland Sea and Antarctic waters.

Poland has rich traditions and significant achievements in polar studies. Nowadays the 50th anniversary of the first Polish independent polar expedition is observed.

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